REMARKS

Claims 1-32 are pending in the subject application. Claims 1-27 have been examined and stand rejected. By the above amendments, claims 1, 7, 13, 14, 19, 26, and 27 have been amended, and new claims 28-32 have been added. Favorable reconsideration of the application and allowance of all of the pending claims are respectfully requested in view of the above amendments and the following remarks.

Independent claim 1 sets forth a method of transmitting a plurality of signals from a common antenna. The claimed method requires: generating a first signal for transmission via a first transmit beam, generating a second signal for transmission via a second transmit beam, forming a composite signal that includes the first and second signals, wherein the phase of the composite signal accounts for signal modulation and beam forming characteristics of the first and second signals; supplying the composite signal to the common antenna; and transmitting the composite signal from the common antenna, thereby transmitting first and second signals via the first and second transmit beams, respectively. As amended, claim 1 further requires that the composite signal have a constant amplitude envelope (this limitation was originally recited in dependent claim 13).

Claim 7 essentially corresponds to the embodiment shown in Fig. 2 and has been rewritten in independent form. In addition to the limitations of original claim 1, claim 7 requires: generating first modulated signals corresponding to antenna elements for transmission via a first transmit beam, and phase shifting the first modulated signals in accordance with phases of the antenna elements required to form the first transmit beam; and generating, separate from the first modulated signals, second modulated signals corresponding to antenna elements for transmission via a second transmit beam, and phase shifting the second modulated signals in accordance with phases of the antenna elements required to form the second transmit beam; and forming a plurality of composite signals by combining phase shifted first modulated signals with respective phase shifted second modulated signals.

Independent claim 14 sets forth an apparatus for transmitting a plurality of signals, wherein the apparatus includes: a phased array antenna; and a transmitter system that receives a first signal for transmission via a first transmit beam and a second signal for transmission via a second transmit beam, wherein the transmitter system forms a plurality of composite signals and supplies the composite signals to the respective antenna elements of the phased array antenna, wherein the phases of the composite signals are a function of signal modulations of the first and second signals and phases of the respective antenna elements required to form the first and second transmit beams, wherein the phased array antenna transmits the first and second signals via the first and second transmit beams, respectively. As amended,

claim 14 further requires each of the composite signals to have a constant amplitude envelope (this limitation was originally recited in dependent claim 26).

Claim 19 essentially corresponds to the embodiment shown in Fig. 2 and has been rewritten in independent form. In addition to the limitations of original claim 14, claim 19 essentially recites the components required to phase shift a plurality of first modulated signal and to separately phase shift a plurality of second modulated signals and then combine the phase shifted first and second modulated signals to form the plurality of composite signals.

Independent claim 27 sets forth an apparatus for transmitting a plurality of signals, wherein the apparatus includes: a phased array antenna; and means for forming a plurality of composite signals from a first and a second signal, and for supplying the composite signals to respective antenna elements of the phased array antenna for transmission, wherein the phases of the composite signals are a function of signal modulations of the first and second signals and phases of the respective antenna elements required to transmit the first signal via a first transmit beam and to transmit the second signal via a second transmit beam. As amended, claim 27 further requires each of the composite signals to have a constant amplitude envelope.

New independent method claim 28 is similar to original claim 1, but further requires the interleaving feature recited in dependent claim 12. Specifically, claim 28 recites forming a composite signal by time interleaving the first signal and the second signal, wherein the phase of the composite signal accounts for signal modulation and beam forming characteristics of the first signal and, alternately, the signal modulation and beam forming characteristics of the second signal. New dependent claim 29-31 essentially recite the same limitations found in dependent claims 5, 9, and 10, respectively.

New independent apparatus claim 32 is similar to original claim 14, but further requires the interleaving feature recited in dependent claim 25. Specifically, claim 32 recites a transmitter system forming a plurality of composite signals by time interleaving the first signal and the second signal, wherein phases of the composite signals are a function of a signal modulation of the first signal and phases of the respective antenna elements required to form the first transmit beam and, alternately, a function of a signal modulation of the second signal and phases of the respective antenna elements required to form the second transmit beam.

Claims 1-27 stand rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent Application Publication No. 2003/0095068 to Purdy et al. Applicant respectfully submits that claims 1-27, as amended, and new claims 28-32 are not anticipated by Purdy for the following reasons.

Purdy discloses a system for generating a multiple simultaneous electronically scanned beams with an array of antenna elements, wherein the multiple beams are formed combining multiple signals into a composite signal. However, Purdy's system differs from that of the present invention in a number of important respects. As explained at length in Applicant's specification, it is preferable that the composite signal supplied to the antenna elements of the phased array antenna have a constant amplitude envelope so that saturated high power RF amplifiers can be used, rather than less efficient linear amplifiers. Applicant further discloses a novel technique for generating a constant envelope composite signal. Independent claims 1, 14, and 27 have been amended to require the composite signal formed by combining the component signals to have a constant amplitude envelope.

Purdy does not disclose or suggest a composite signal having a constant amplitude envelope. In fact, it is clear from Purdy's disclosure that the composite signal supplied to the antenna array has a variable amplitude. Note, for example, in Fig. 2 of Purdy that the RF signal generated by the direct digital synthesizer 18 is amplitude modulated with signal A_n. Moreover, it is repeated explained in Purdy's disclosure that the composite signal has a variable amplitude (see, e.g., paragraphs 0021, 0023, 0024, and equations 3a-3c and 4). Beyond the fact that Purdy does not disclose a constant envelope composite signal, Purdy does not include any disclosure of how one could generate a constant envelope composite signal. Note again that Applicant has provided a detailed explanation of how to generate the claimed constant envelope composite signal. Accordingly, Purdy does not anticipate claims 1, 14, and 27 and their dependent claims.

Moreover, independent claims 7 and 19 require generating first modulated signals corresponding to antenna elements for transmission via a first transmit beam, and phase shifting the first modulated signals in accordance with phases of the antenna elements required to form the first transmit beam; and generating, separate from the first modulated signals, second modulated signals corresponding to antenna elements for transmission via a second transmit beam, and phase shifting the second modulated signals in accordance with phases of the antenna elements required to form the second transmit beam; and then forming composite signals by combining phase shifted first modulated signals with respective phase shifted second modulated signals. These claims correspond to the arrangement shown in Applicant's Fig. 2.

Purdy does not disclose or suggest separately generating two or more signals, separately phase modulating the two signals for beam pointing, and then subsequently combining the two phase modulated signals to form a composite signal. In fact, Purdy expressly teaches away from adopting this approach to

beam forming. Specifically, Purdy repeatedly emphasizes that the principal advantage of the disclosed system is that only a single direct digital synthesizer (DDS) is required per radiating element, because the multi-beam forming synthesizer combines all of the input signals to produce a composite amplitude, frequency, and phase control signal for the DDS that takes into account the modulation of all the signals as well as the beam forming phase of the particular antenna element. In contrast, claims 7 and 19 clearly require phase shifting the first signal to form the first transmit beam and separately phase shifting the second signal to form the second transmit beam (i.e., separately forming the two transmit beams) and then combining the two beams to form the composite signal. This approach is precisely what Purdy is trying to avoid (see paragraph 0007 of Purdy). Accordingly, Purdy does not anticipate claims 7 and 19 and their dependent claims. For all of the foregoing reasons, the Examiner is respectfully requested to reconsider and withdraw the rejection of claims 1-27.

Claims 1-27 stand rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 3,872,477 to King. Applicant respectfully traverses this rejection for the following reasons.

King discloses a direction finding technique wherein an RF signal is emitted from a beacon or the like and then received by two antennas positioned at a fixed distance apart. The signals received by the two antennas are then combined to form a composite signal whose characteristics indicate the bearing of the source of the signal. In short, King discloses a receiver system.

Method claims 1 and 7 set forth a method of transmitting a plurality of signals from a common antenna. In contrast, King's system involves transmitting one signal from a distant source and detecting that signal in two locations to determine the bearing of the signal (King's technique does not work unless the same signal is being received by both antennas). Moreover, claims 1 and 7 require generating a first signal for transmission via a first transmit beam and a second signal for transmission via a second transmit beam. Again, there is only one beam and one signal in King's system – this is fundamental to direction finding with spaced apart receiving antennas. Claims 1 and 7 further require the phase of the composite signal to account for signal modulation and beam forming characteristics of the first and second signals. Contrary to the Examiner's assertion, there is no mention whatsoever of beamforming in King's disclosure, much less accounting for both beamforming and signal modulation of plural signals in a transmit signal. In fact, it is not clear from King's disclosure whether the transmitted signal is even a directional signal involving forming a beam from phase controlled signals or pointing of a beam. Finally, King does not disclose transmitting a composite signal from a common antenna as required by claims 1 and 7. Rather King forms a composite signal from signals received at two spaced apart antennas.

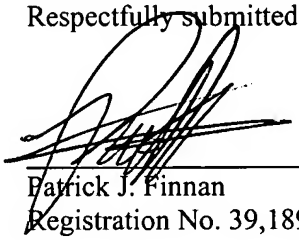
All of claims 14, 19, and 27 require a phased array antenna comprising an array of antenna elements, wherein the phased array antenna transmits a first signal via a first transmit beam and a second signal via a second transmit beam. King does not disclose a phased array antenna at all. Moreover, the claimed phased array antenna transmits signals. In contrast, the only antennas described in King receive signals. For at least the foregoing reasons, King does not anticipate any of claims 1-17; accordingly, the Examiner is respectfully requested to reconsider and withdraw this rejection.

New independent method claim 28 is similar to original claim 1, but further requires forming a composite signal by time interleaving the first signal and the second signal, wherein the phase of the composite signal accounts for signal modulation and beam forming characteristics of the first signal and, alternately, the signal modulation and beam forming characteristics of the second signal. Likewise, new independent apparatus claim 32 is similar to original claim 14, but further requires a transmitter system forming a plurality of composite signals by time interleaving the first signal and the second signal, wherein phases of the composite signals are a function of a signal modulation of the first signal and phases of the respective antenna elements required to form the first transmit beam and, alternately, a function of a signal modulation of the second signal and phases of the respective antenna elements required to form the second transmit beam. Neither Purdy nor King discloses or suggests forming a composite signal by time interleaving first and second signals. Accordingly, the Examiner is respectfully requested to find claims 28-32 allowable.

In view of the foregoing, Applicant respectfully request the Examiner to find the application to be in condition for allowance with claims 1-32. However, if for any reason the Examiner feels that the application is not now in condition for allowance, the Examiner is respectfully requested to call the undersigned attorney to discuss any unresolved issues and to expedite the disposition of the application.

Filed concurrently herewith is a Petition (with payment of $110) for an Extension of Time of One Month. Also filed herewith is an excess claim fee payment in the amount of $442 for four independent claims in excess of the three previously paid for ($352) and five total claims in excess of the twenty-seven previous paid for ($90). Applicant hereby petition for any extension of time which may be required to maintain the pendency of this case, and any required fee for such extension is to be charged to Deposit Account No. 05-0460.

Respectfully submitted,



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